Palo Verde Diversion Project

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Palo Verde Diversion Dam

Unlike other areas in the Sonoran desert, the Palo Verde Valley had water available prior to construction of the Palo Verde Diversion Dam. However, construction of dams upstream of the Palo Verde on the Colorado River lowered the elevation of the Colorado River and made it difficult for the irrigators in the valley to divert river water. The Palo Verde Diversion Dam was built, therefore, not to deliver water, but to guarantee the supply of water.

Project Location

The Palo Verde Diversion Dam is located along the Colorado River in southern California about nine miles northeast of Blythe. While the dam is located wholly in California, the levee system reaches into Arizona and onto the Colorado River Indian Tribes Reservation.

Historic Setting

Prehistoric Setting

Prior to contact, the Palo Verde Valley was home to several tribes of Yuman Indians, the dominant being the Quechans, or the river people, and the Mojave. As it was their only constant source of water, the indigenous people relied heavily on the bounty of the lower Colorado River. Riverine subsistence tended toward foraging, hunting, and gathering, supplemented by limited agriculture. No evidence of irrigation remains, leading archaeologists to believe that native agricultural practices relied mostly on the flood water of the Colorado River. Early agriculture included maize, beans, squash, melon, and grasses. In addition, the Yuman people ate wild plant food such as mesquite. Primary protein came from river fish, particularly humpbacked sucker and pike minnow, and from game including rabbits, squirrels, pack rats, deer, and bighorn

sheep.[1]

During the early nineteenth century the Halchidhoma, a group of river Yumans, occupied the Palo Verde Valley. Territorial and belligerent, the Halchidhoma were confrontational to other tribes in the valley. Ultimately they were forced out of the Palo Verde Valley by other Yuman tribes, and by the 1830s the Halchidhoma were forced to assimilate into the Maricopa tribe in central Arizona.[2]

By the late nineteenth century European Americans had settled in the Palo Verde Valley. The indigenous people were concentrated onto the Colorado River Indian Tribes Reservation that was established by an act of Congress and approved by President Grant on March 3, 1865.[3] The Colorado River Indian Tribes Reservation is now home to members of the Mojave, Chemehuevi, Hopi, and Navajo tribes.[4]

Historic Setting

The indigenous people of the Palo Verde Valley had first contact with Europeans in 1540 when Captain Hernando de Alarcon led the overland expedition of Coronado's search for the mythic Seven Cities of Cibola.[5] In the centuries that followed, the Palo Verde Valley became a regular point of passage through which Spanish and Mexican missionaries and traders traveled.

The first recorded Anglo visitor to the Palo Verde Valley was the famous scout Kit

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1. Joseph A. Ezzo and Jeffrey H. Altschul, "An Archaeological Survey of Palo Verde Point, Imperial County, California: Class 3 Cultural Resources Survey and Evaluation" (Tucson, Arizona: Statistical Research, Inc.), p. 12; William C. Sturtevant and Alfonso Ortiz, eds., *Handbook of North American Indians: Southwest*, Volume 10 (Washington, D.C.: Smithsonian Institution, 1993), p. 1-3, 86-98.
2. Ezzo and Altschul, p. 13.
3. Department of the Interior, Bureau of Reclamation, "Final Construction Report on Palo Verde Diversion Dam and Levee System, February 1959" (Boulder City, Nevada: United States Government Printing Office, 1959), p. 2.
4. Veronica E. Velarde Tiller, ed., *Tiller's Guide to Indian Country* (Albuquerque, New Mexico: Bow Arrow Publishing Company, 1996), p. 200-1.
5. Matthew A. Sterner, "A Cultural Resource Overview for the Yuma Division Project" (Tucson, Arizona: Statistical Research, Inc., 1992), p. 14.

Carson, who crossed the Colorado River at the Gila River in October of 1846.[6] Carson's trail, known as the Gila Crossing, marked the beginning of a new era for the Palo Verde Valley. Gila Crossing was not only a pathway for American soldiers fighting the Mexicans in California, but it also guided new settlers to the area. Permanent settlements began emerging in the early 1850s. Like the native people of the valley, the new settlers survived by growing crops. However, the white settlers needed a constant supply of water and needed a means to bring Colorado River water to the Palo Verde Valley lands.

Surveyor O. P. Calloway was one of the first Anglos to see the possibilities of commercial farming in the Palo Verde Valley. Calloway convinced San Francisco financier Thomas Blythe to finance an irrigation project. Blythe acquired the primary water rights in the area in July 1877, and retained them until his death in 1883. Upon his death, Blythe's assets were frozen and his estate placed in litigation. In 1908, Frank Murphy and the Hobson brothers of Ventura, California, bought the Blythe estate and formed the Palo Verde Land and Water Company. Three years later 40,000 acres of government lands were opened to homesteaders, suddenly creating a new demand for water in the Palo Verde Valley.[7]

The greater demand for water required better organization for acquisition. There were three organizations operating within the Palo Verde Valley: the Palo Verde Land and Water Company, the Palo Verde Joint Levee District, and the Palo Verde Drainage District. In 1923, the California State Legislature, at the request of the Palo Verde Valley water users, approved the process that created the Palo Verde Irrigation District (PVID) and provided for the assumption of the duties of the Joint Levee District and the Drainage District. The act also

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6. Sterner, p. 19.
7. Department of the Interior, Bureau of Reclamation, "Final Construction Report on Palo Verde Diversion Dam and Levee System, February 1959" (Boulder City, Nevada: United States Government Printing Office, 1959), p. 2.

authorized the acquisition of the physical properties and water rights of the Palo Verde Mutual Water Company. PVID became the sole operating agency in the Palo Verde Valley for the purposes of river control, drainage, and irrigation.[8] The PVID is still in operation today.

As early as the 1920s the Colorado River water that nourished the flood plains of the Palo Verde Valley had begun to recede. The recession caused irrigation problems so a new river channel was dredged. Although the new channel delivered more water to the irrigation system, the overall effect was not positive. The new channel lowered the water level of the Colorado River by nearly three feet while also increasing the chance of floods in the irrigation canals.[9]

During World War II, the farms in the Palo Verde Valley provided the military with a substantial amount of produce, thus transforming the improvement of the irrigation system into a facet of the war effort. Lack of funding forestalled the construction of a permanent dam, however, Bureau of Reclamation engineers determined that a temporary rock weir would solve the problem. As an item on the First Deficiency Appropriations Act, on April 1, 1944, Congress allocated $250,000 for construction of a temporary rock weir for the Palo Verde Irrigation District.[10]

The Bureau of Reclamation began construction of the Palo Verde weir in June 1944 and it was completed by the following March. The weir was built by a random dumping of rock on the alluvial river bottom. Although the weir accomplished its purpose of raising the water level to provide an adequate diversion to the Palo Verde Irrigation District, not all residents of the Palo Verde Valley were pleased with the results. The Colorado River Indian Tribes Reservation

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8. Department of the Interior, Bureau of Reclamation and Office of Indian Affairs, "Joint Report on Investigations of a Permanent Solution of the Palo Verde Irrigation District Diversion Problem: California-Arizona, Project Planning Report, no.3-8b.28.0, March 26, 1947" (Washington, D.C.: United States Department, 1947), p. 5.
9. Department of the Interior, Bureau of Reclamation and Office of Indian Affairs, "Joint Report on Investigations of a Permanent Solution of the Palo Verde Irrigation District Diversion Problem: California-Arizona, Project Planning Report, no.3-8b.28.0, March 26, 1947" (Washington, D.C.: United States Department, 1947), p. 6.
10. "The Palo Verde Weir," *Reclamation Era* (February 1961, 47:1),p. 9-12.

and Bureau of Indian Affairs were displeased about the weir because it had adverse effects on their lands. The weir decreased the amount of drainage and thus increased the flood hazard on the reservation.[11]

After the war, the Department of the Interior determined that it was necessary to establish a permanent means of diverting water from the Colorado River into the canal system of the Palo Verde Irrigation District that would not produce adverse effects on neighboring communities. In July of 1953 Assistant Secretary of the Interior, Richard E. Searles, instructed the Bureau of Reclamation to prepare feasibility designs and estimates on the cost of building a permanent dam structure in the Palo Verde Valley. In addition, Searles asked the Bureau of Indian Affairs to prepare estimates for flood control levees to be built on the reservation. The report was ready in January of 1954 and endorsed construction of a dam.

Project Authorization

The Palo Verde Diversion Dam was authorized under Public Law 752, enacted by the 83rd Congress on August 31, 1954. The law directed removal of the temporary rock weir and construction of a permanent diversion dam and appurtenant structures to stabilize the water level for the Palo Verde Irrigation District. Construction of levees and a drainage system to protect the land of the Colorado River Indian Tribes Reservation was also funded by the Act. The federal government would lend the PVID up to $500,000 to modify the existing irrigation canal system. The Federal Government and PVID executed a contract which was approved by the residents of the Palo Verde Valley on September 20, 1955, by a popular vote of 27,260 to 15.[12] In this contract the Federal Government agreed to pay for the construction of the dam up to a

11. Department of the Interior, Bureau of Reclamation and Office of Indian Affairs, "Joint Report on Investigations of a Permanent Solution of the Palo Verde Irrigation District Diversion Problem: California-Arizona, Project Planning Report, no.3-8b.28.0, March 26, 1947" (Washington, D.C.: United States Department, 1947), p. 7.
12. "Annual Project History, Palo Verde Diversion Project, Arizona-California, 1955," Volume 1, p. 16.

cost of $4,532,000. The PVID agreed to repay the Federal Government within fifty years $1,175,000 plus the amount they borrowed for modification of the existing canal system.

Construction History

The project office for the Palo Verde Diversion Dam opened on August 9, 1955, in Blythe, California, at 316 West Hobsonway. A.S. D'Alessandro was designated the Acting Project Construction Engineer, William W. Gage the Field Engineer, and Howard M. Burr the Office Engineer. Construction of the dam was divided into two separately contracted schedules: 1) the dam and the appurtenant structures and 2) the levee system.

Schedule One: The Dam

On December 6, 1955, bids were opened for construction of Palo Verde Diversion Dam and Levee System. A month later on January 9, 1956, the Schedule One contract was given to W. E. Kier Construction Company of El Segundo, California. W. E. Kier Construction Company initiated construction on February 9, 1956, by starting to clear the construction area adjacent to the PVID's intake canal. By summer, full-scale excavation of the dam site had begun and by August the construction company hired a swing shift to accelerate completion. On November 8, 1956, the first cement was poured for the right abutment wall of spillway block four.

Overall construction of the Schedule One portion of the dam went smoothly. One exception was the so-called "wildcat strike" which occurred the morning of April 26, 1957. There was a four-hour work stoppage caused by a jurisdictional dispute between the boilermakers' and the structural ironworkers' unions over assembly and installation of the radial gates. The ironworkers' union was favored and construction resumed without further delay.[13]

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13. "Annual Project History, Palo Verde Diversion Project, Arizona-California, 1957," Volume 3, p. 12.

On September 5, 1957, the upstream cofferdam was removed allowing water to flow to the diversion dam. Six days later at 2:10 P.M. the final section of the embankment was closed forcing complete diversion of the river through the spillway structure. In addition to the work specified by schedule one, the modification of the canal system for which the PVID borrowed the full $500,000, was completed on November 4, 1957. On December 17, 1957, the work completed by the W. E. Kier Construction Company under Schedule One was accepted by the Bureau of Reclamation. The final construction contract payment was $2,235,799.36. The United States immediately turned over the Palo Verde Diversion Dam and appurtenant structures to the Palo Verde Irrigation District for operation and maintenance.

At 3:30 P.M. on December 17, 1957, a completion ceremony for the Palo Verde Diversion Dam was held on the spillway bridge. In attendance were Bureau of Reclamation Regional Director Wade Taylor, Reclamation Assistant Regional Director Vaud Larson, PVID Board President Don Underwood, and PVID Manager O. E. Simmons.[14]

The dam, including the spillway, is 1,850 feet long, with a twenty-foot wide crest and a maximum height of fifty feet above the riverbed. The design is a concrete ogee gated weir with two embankment zones containing 157,000 cubic yards of sand, gravel, cobble fill, and riprap. The spillway control structure is built on rock and is located on the right abutment of the dam. It is a gated structure with three fifty-foot bays separated by two eight-foot-thick cement piers. The canal headworks is designed to direct a maximum capacity of eighteen hundred cubic feet per second of Colorado River water into the Palo Verde Irrigation District canals. The structure includes a channel between the headwork structures and the existing desilting basin. The

14. "Annual Project History, 1957," p. 19.

headworks include four radial gates measuring eight by twelve feet.[15]

Schedule One also specified the construction of two residences to be occupied by the gate tenders. Bids for the construction of the residences opened on November 19, 1957. Reclamation awarded the contract to the Dennis Construction Company of Yuma, Arizona, on January 6, 1958. Construction of two three-bedroom homes began on January 20, 1958. Work was completed on March 19, and the residences were turned over to the Palo Verde Irrigation District for operation and maintenance. The final contract construction payment was $25,695.[16]

Schedule Two: The Levee System

Schedule Two specified construction of a levee system and a drain. The 32 mile levee system was divided into three reaches, the Lower Arizona Levee, the Upper Arizona Levee, and the California Levee, to be built on the Colorado River Indian Tribes Reservation which extended approximately 52 miles north of the PVID. Because they were on tribal land, prior to being built the levees had to be approved by both the Bureau of Indian Affairs and the Tribal Council. The Tribal Council gave permission for construction, conferring all rights of way and access to reservation land to the Bureau of Indian Affairs on December 18, 1954.[17] On August 26, 1955, the Bureau of Reclamation and the Bureau of Indian Affairs signed a Memorandum of Agreement permitting Reclamation to construct a levee and drainage system.

Like Schedule One, bids for Schedule Two opened on December 6, 1955. Prior to opening the bids, Reclamation engineers established what they considered to be a reasonable range of cost for the project based on criteria such as quality of material and location. However,

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15. United States Department of the Interior, Water and Power Resources Service, *Project Data, 1981* (Denver: United States Government Printing Office, 1981), p. 755.
16. "Annual Project History, Palo Verde Diversion Project, Arizona-California, 1958," Volume 4, p. 25.
17. Resolution no. 257-54 of the Colorado River Tribal Council passed on December 18, 1954 was amended on May 28, 1955, granting to the United States consent to conduct surveys for the levees and drain. "Annual Project History, 1955," p. viii.

all the bids for Schedule Two were too low, causing Reclamation to believe that the work would be unacceptable, so the bidding process had to be reopened on January 12, 1956. Reclamation awarded the entire Schedule Two contract to Euclid Construction Company of Phoenix, Arizona, on February 2, 1956. The Euclid Construction Company initiated construction on March 2, 1956, with their subcontractor R. H. Thompson, beginning clearing and stripping operations on one of the drain stations at the Colorado River.

Financial problems soon began to retard construction of the levee system. A change in the management at the Euclid Construction Company resulted in having all of their accounts receivable sent to Detroit, leaving the Phoenix office with no funds for accounts payable at the Palo Verde Project. On July 20, 1956, at 10:00 A.M., Euclid Construction Company had to suspend all operations due to financial difficulties. Although Euclid resumed operations on July 25, the financial fix was only temporary as they filed a voluntary petition for corporate reorganization (Chapter 11) on August 17. Construction continued during the restructuring until October 5 when the U.S. Court ordered Euclid Construction to discontinue operations with their subcontractors and suspend all construction. On October 17, Assistant Commissioner for Irrigation and Power Edwin G. Nielsen and Reclamation Chief Engineer L. N. McClellan officially terminated the contract with Euclid Construction for completion of the levee system.[18]

The United States Fidelity and Guaranty Company, Euclid Construction's surety agent, was bound to take over the defaulted Schedule Two contract. On November 14, the United States Fidelity and Guaranty Company made an agreement with the Imperial Valley Paving Company to complete the unfinished portion of the levee system. Imperial Valley Paving Company subcontracted the work to R. H. Thompson, the same contractor Euclid had used, and

18. "Annual Project History, Palo Verde Diversion Project, Arizona-California, 1956," Volume 2, p. 42-3.

construction resumed on December 12, 1956.

Construction on the levee system proceeded throughout 1957 until September 20 when the Imperial Valley Paving Company ceased all operations. No further work was performed until December 30, 1957, when subcontractor R. H. Thompson resumed construction of the California Levee and the Lower Arizona Levee. A new subcontractor, Carter and Schneider Construction Company of Las Vegas, Nevada, was hired by the United States Fidelity and Guaranty Company to complete the Upper Arizona Levee. On August 4, 1958, the Bureau of Reclamation accepted the work completed by the United States Fidelity and Guaranty Company specified by Schedule Two. The final construction contract payment $1,023,154.36.[19] The United States transferred the Levee System to the Bureau of Indian Affairs for operation and maintenance on August 20, 1958.

Because the works were not put into immediate use, the drain bottom and slopes became covered with a thick growth of tules and weeds. To assure proper drainage, the weeds were destroyed at a cost of $8,527.25, split by the contractor, the Bureau of Reclamation, and the Bureau of Indian Affairs.[20]

The entire length of the 30 mile levee system is surfaced with six inches of gravel to provide a roadway for maintenance purpose and public access to various points on the river. The levees are designed to withstand a flood of 75,000 cubic feet per second. At the request of the Tribal Council of the Colorado River Indian Tribes Reservation, the levees are located approximately 1,300 feet from the east shoreline to prevent encroachment and to allow space for recreational development. To prevent flooding on the Colorado River Indian Tribes Reservation, a twenty-mile intercepting drain parallels the Lower Arizona Levee approximately three hundred

19. "Annual Project History, 1958," p. 15.
20. "Annual Project History, 1958," p. 24-5.

feet from the landward side. The drain is designed for a capacity of thirty cubic feet per second at the upstream end, increasing to one hundred twenty-eight cubic feet per second at the outfall below the dam. Six bridges span the drain to provide access to the levee and to the river front.[21]

Post-Construction History

Since completion in 1958, the Palo Verde Diversion Dam has functioned without incident. Frequent inspections reveal the regular overgrowth of weeds and salt cedar; however, the structures have remained in good condition. Because of the Palo Verde Valley's contribution to salinity and increased sedimentation in the Colorado River, the Palo Verde Diversion system was modified under the Colorado River Front Work and Levee System. In May 1962, construction began on a twenty-eight-mile river channel south of the Palo Verde Dam. Completed in September 1968, the work provided channel stability, 10,000 acre-feet of annual water salvage, and created structures to benefit fish and wildlife.[22] On August 14, 1981, Public Law 97-41 authorized the Palo Verde Diversion Dam to generate hydroelectric power, although construction has not yet begun on any generating facilities.

As of July 1991, the active names for the project are the Palo Verde Diversion Dam or the Palo Verde Diversion Project. Information on the diversion project is also cited under the Palo Verde Division: Colorado River Front Work and Levee System. The project has be referred to by many names, including Palo Verde Diversion Problem Investigations, Palo Verde Mesa Coordinating Investigations, Palo Verde Mesa Project, Palo Verde Small Hydropower Project, and the Palo Verde (Blythe) Project (or Palo Verde Project).

Settlement of the Project

The Palo Verde Valley was settled prior to the construction of the Palo Verde Diversion

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21. *Project Data, 1981*, p. 757; Tiller, p. 201.
22. *Project Data, 1981*, p. 331-54.

Dam. The major towns in the area were Blythe, Ripley, and Palo Verde. Although the population of the Palo Verde Valley grew after the construction the diversion dam, growth was neither rapid nor enormous.

Uses of Project Water

The construction of the Palo Verde Diversion Dam ensured an adequate supply of irrigation water to the Palo Verde Irrigation District. The principal crops in this area are alfalfa, cotton, barley, melons, lettuce, and pasture. In addition, the Colorado River Indian Tribes Reservation converted a portion of the levee system into the Blue Water Mountain Park, a recreational area. Recreational-development leases are also available for this property.

Conclusion

The Palo Verde Diversion dam is a relatively insignificant dam. The name is not recognizable to most and even the Bureau of Reclamation has grouped the dam's statistics in with the Colorado River Front Work and Levee System statistics. The Palo Verde Diversion Dam does not affect system storage capacity or Reclamation's ability to regulate stream flows. The diversion dam provides the means for a high priority Colorado River water user to divert water to its lands. It maintains a constant water surface elevation at the canal intake during periods of normal riverflow. Perhaps its obscurity is an indication of its success.

About the Author

Lara Bickell received her B.A. and M.A. from Pepperdine University. She wrote her M.A. thesis on newspaper publisher Eugene C. Pulliam and his influence as a booster in post-World War II Phoenix, Arizona. She is currently working on her doctorate in American history at Claremont Graduate University. Lara lives in Los Angeles with her husband and a menagerie of animals.

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